



## 30N06-Q

Power MOSFET

### 60V, 30A N-CHANNEL POWER MOSFET

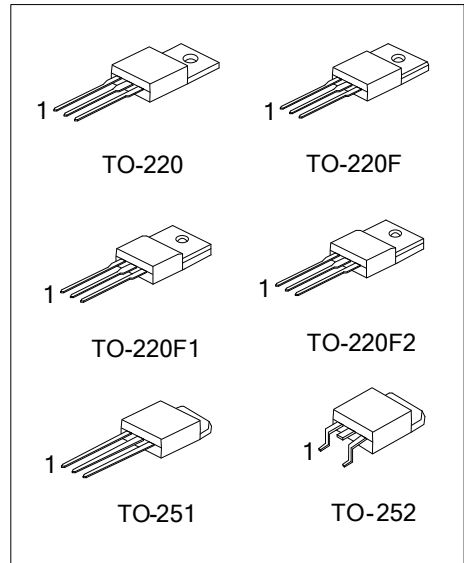
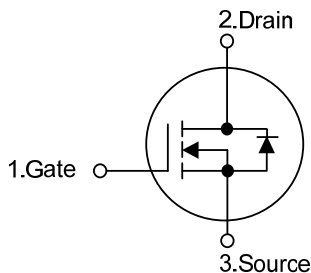
#### DESCRIPTION

The UTC **30N06-Q** is a low voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and excellent avalanche characteristics. This power MOSFET is usually used at automotive applications in power supplies, high efficient DC to DC converters and battery operated products.

#### FEATURES

- \*  $R_{DS(ON)} = 40m\Omega @ V_{GS} = 10V, I_D = 15A$
- \* Ultra low gate charge ( typical 20nC )
- \* Low reverse transfer Capacitance (  $C_{RSS} =$  typical 80 pF )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
30N06L-TA3-T	30N06G-TA3-T	TO-220	G	D	S	Tube
30N06L-TF1-T	30N06G-TF1-T	TO-220F1	G	D	S	Tube
30N06L-TF2-T	30N06G-TF2-T	TO-220F2	G	D	S	Tube
30N06L-TF3-T	30N06G-TF3-T	TO-220F	G	D	S	Tube
30N06L-TM3-T	30N06G-TM3-T	TO-251	G	D	S	Tube
30N06L-TN3-T	30N06G-TN3-T	TO-252	G	D	S	Tube
30N06L-TN3-R	30N06G-TN3-R	TO-252	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>30N06L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TN3: TO-252 (3) L: Lead Free, G: Halogen Free</p>
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■ ABSOLUTE MAXIMUM RATINGS( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	60	V
Gate to Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	$I_D$	30	A
	$T_C = 100^\circ\text{C}$		21.3	A
Pulsed Drain Current (Note 2)		$I_{DM}$	120	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	250	mJ
	Repetitive (Note 2)	$E_{AR}$	8	mJ
Power Dissipation	TO-220	$P_D$	79	W
	TO-220F/ TO-220F2		45	
	TO-220F1			
	TO-251/TO-252		46	
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Operation Temperature		$T_{OPR}$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repeativity rating: pulse width limited by junction temperature

3.  $L=0.66\text{mH}$ ,  $I_{AS}=30\text{A}$ ,  $V_{DD}=25\text{V}$ ,  $R_G=20\Omega$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	$\theta_{JA}$	62	$^\circ\text{C/W}$
	TO-220F/ TO-220F2		62.5	
	TO-220F1			
	TO-251/TO-252		110	
Junction to Case	TO-220	$\theta_{JC}$	1.9	$^\circ\text{C/W}$
	TO-220F/ TO-220F2		2.7	
	TO-220F1			
	TO-251/TO-252		2.85	

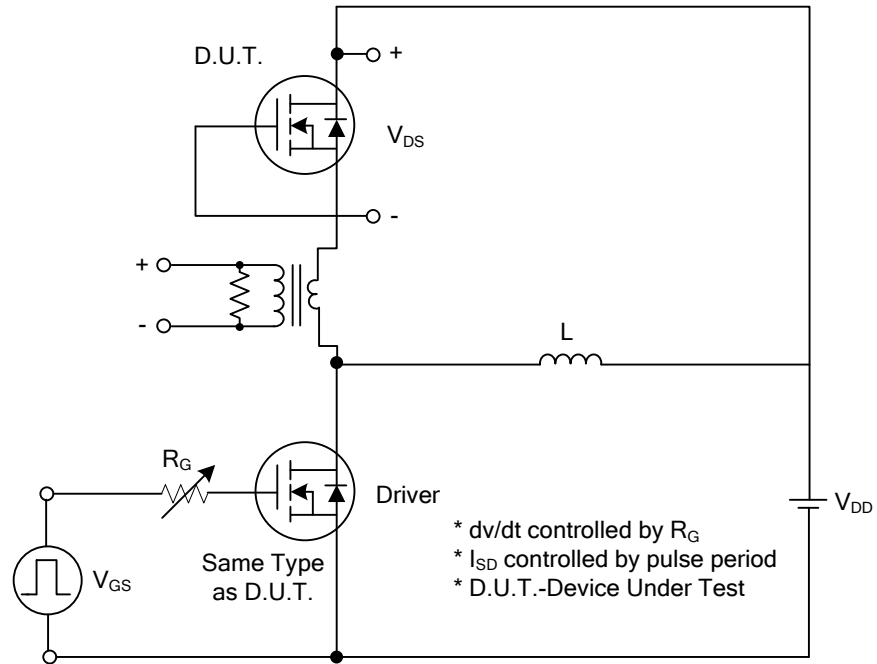
■ ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
	Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		0.06		$\text{V}/^\circ\text{C}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		26	40	$\text{m}\Omega$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$		900		pF
Output Capacitance	$C_{OSS}$			250		pF
Reverse Transfer Capacitance	$C_{RSS}$			85		pF
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 30\text{ V}, I_D = 15\text{ A}, V_{GS} = 10\text{ V}$ (Note 1, 2)		50		ns
Turn-On Rise Time	$t_R$			100		ns
Turn-Off Delay Time	$t_{D(OFF)}$			160		ns
Turn-Off Fall Time	$t_F$			100		ns
Total Gate Charge	$Q_G$	$V_{DS} = 60\text{ V}, V_{GS} = 10\text{ V}$ , $I_D = 24\text{ A}$ (Note 1, 2)		20	30	nC
Gate-Source Charge	$Q_{GS}$			6		nC
Gate-Drain Charge	$Q_{GD}$			9		nC
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 30\text{ A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				30	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				120	A

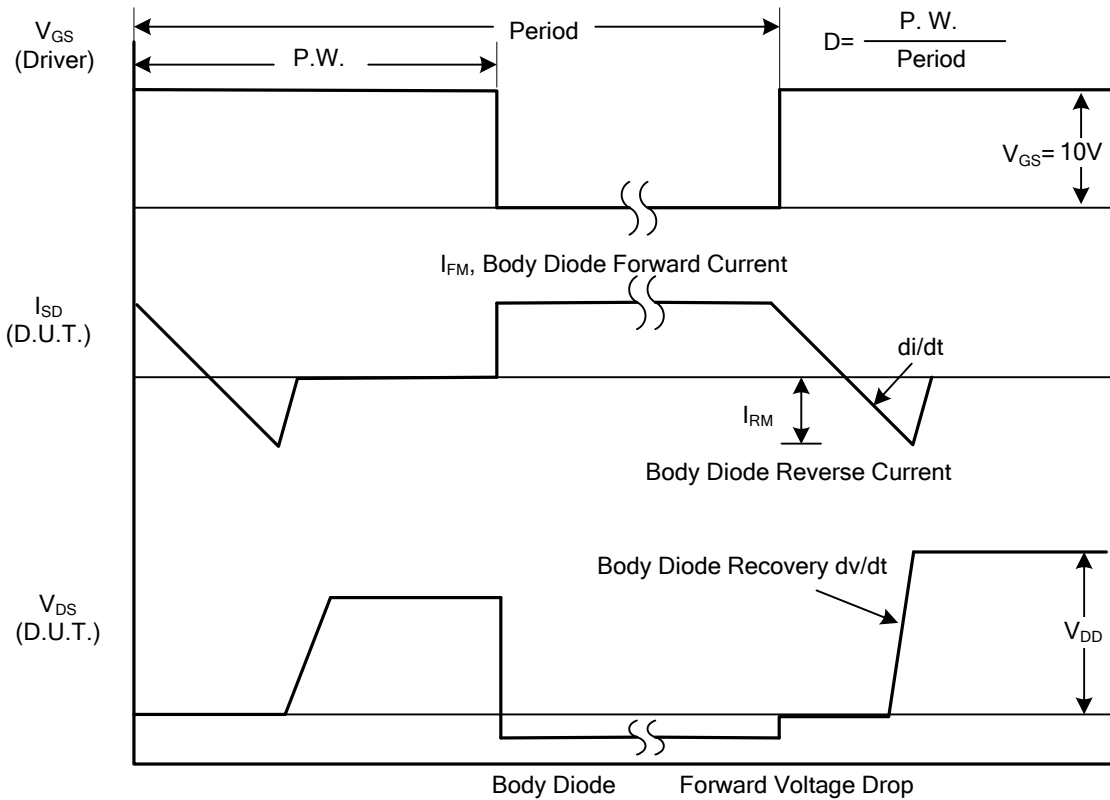
Notes: 1. Pulse Test : Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

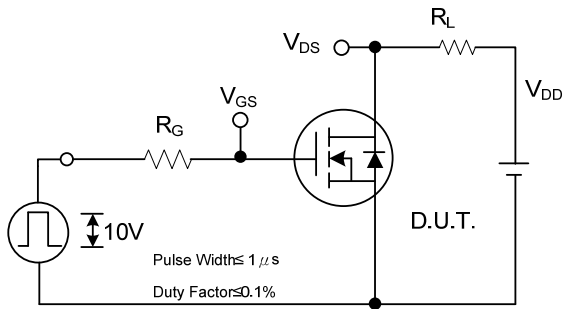


Peak Diode Recovery dv/dt Test Circuit

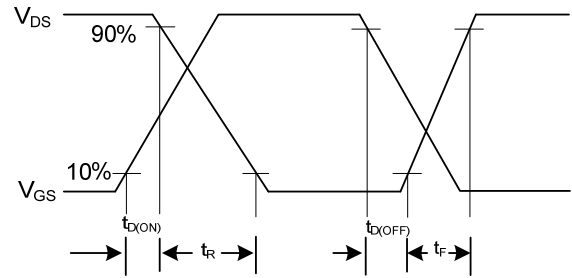


Peak Diode Recovery dv/dt Waveforms

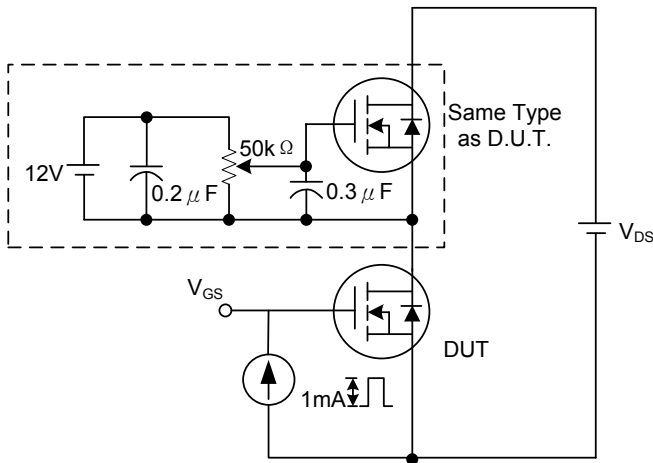
## TEST CIRCUITS AND WAVEFORMS (Cont.)



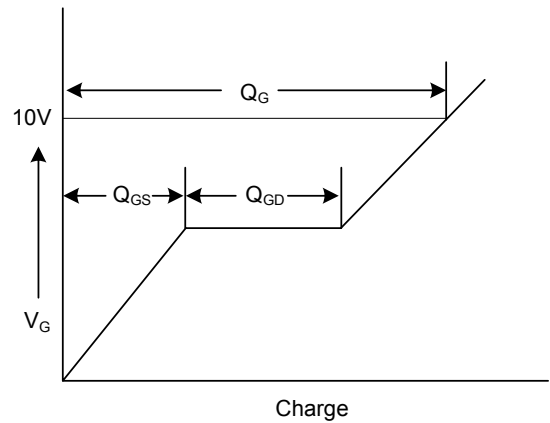
**Switching Test Circuit**



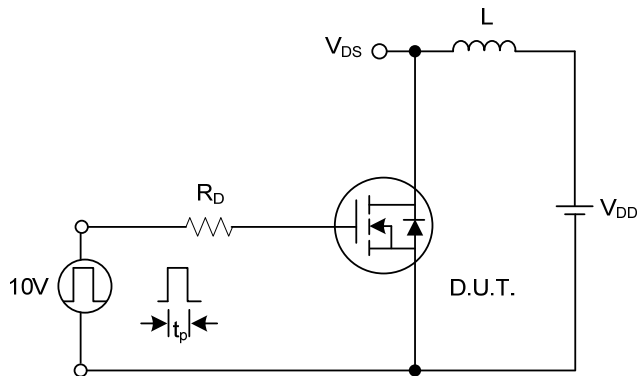
**Switching Waveforms**



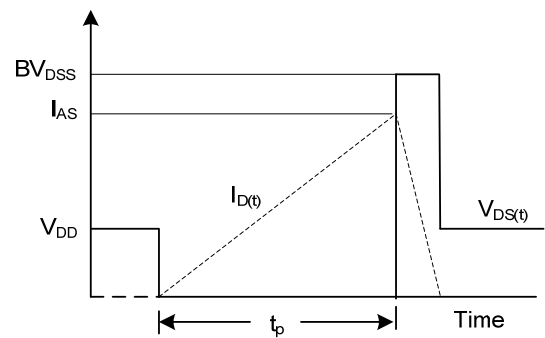
**Gate Charge Test Circuit**



**Gate Charge Waveform**

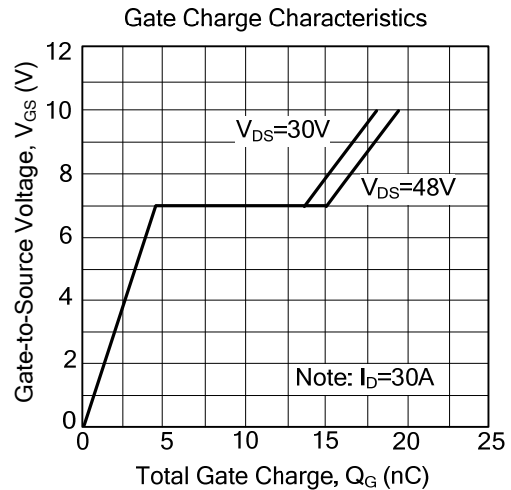
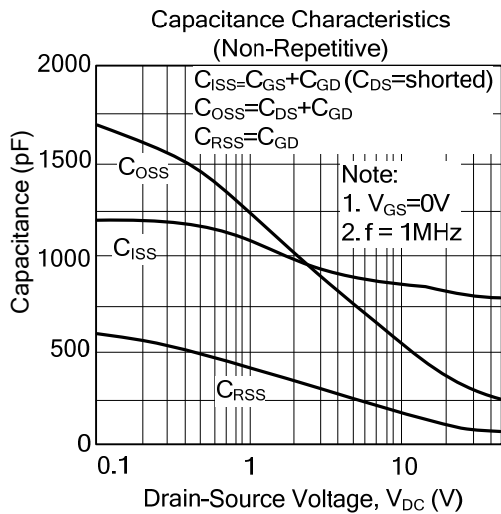
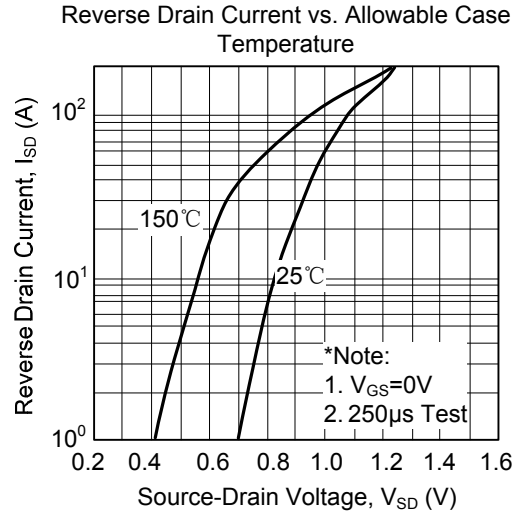
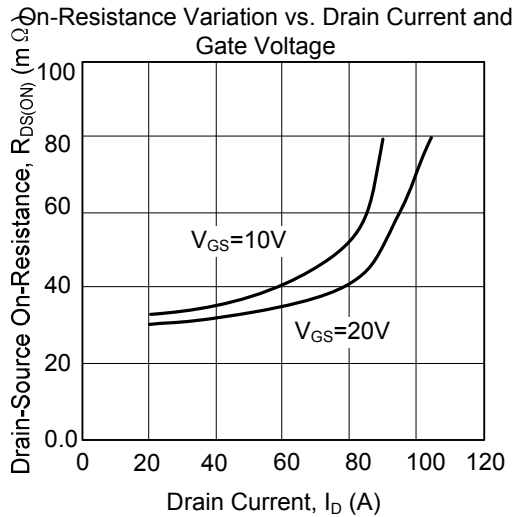
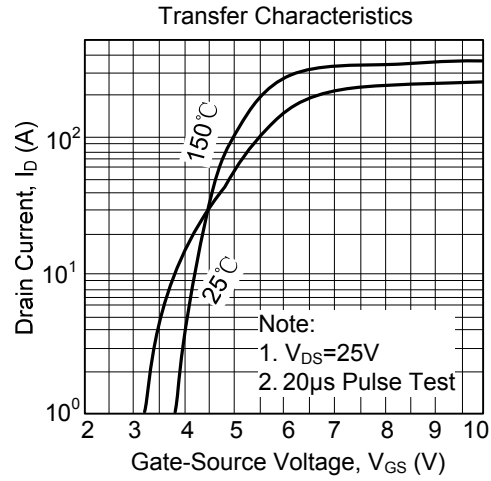
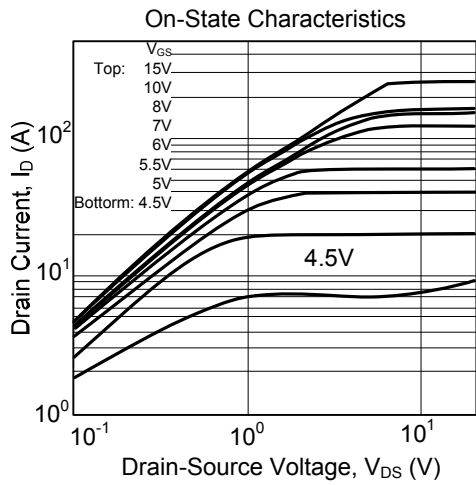


**Unclamped Inductive Switching Test Circuit**

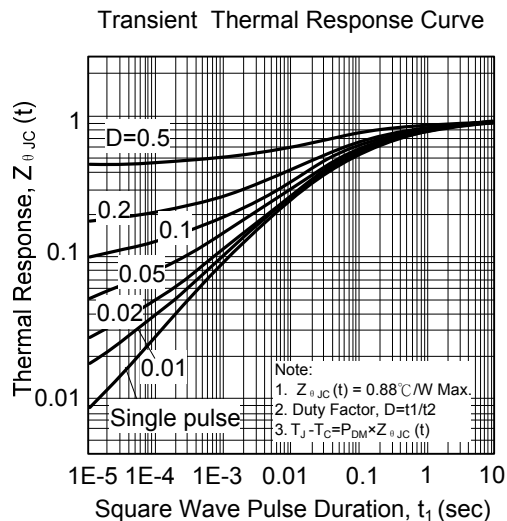
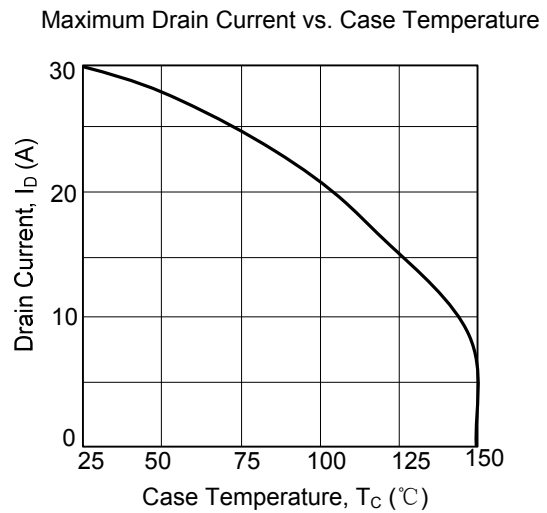
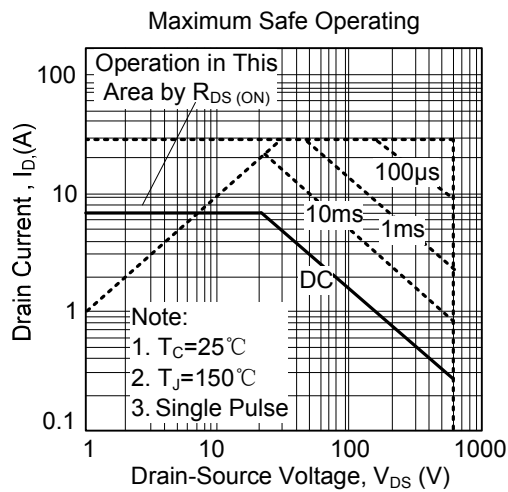
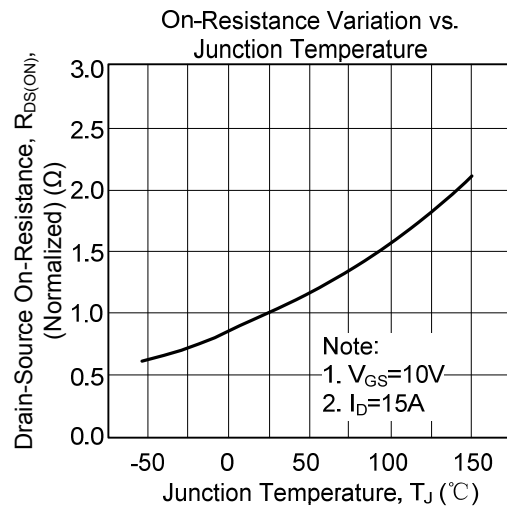
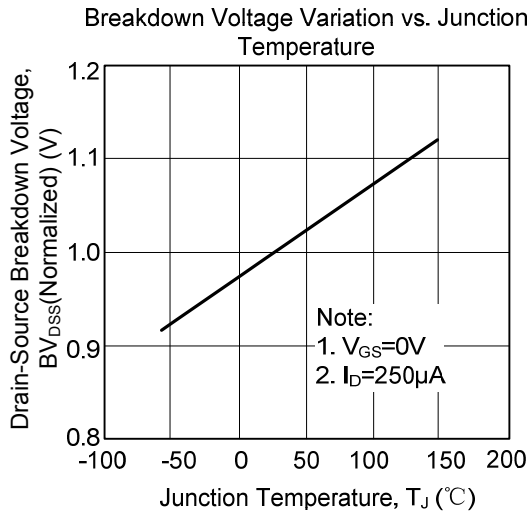


**Unclamped Inductive Switching Waveforms**

## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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